

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau(43) International Publication Date  
12 September 2003 (12.09.2003)

PCT

(10) International Publication Number  
WO 2003/074169 A3(51) International Patent Classification<sup>7</sup>: **B01J 31/24**,  
C07F 9/6568, C07D 333/26, 333/62, 209/04, 207/46,  
C07F 3/00(74) Agent: GERVASI, Gemma; Notarbartolo & Gervasi  
S.p.A., Corso di Porta Vittoria, 9, I-20122 Milano (IT).(21) International Application Number:  
PCT/EP2003/002160

(22) International Filing Date: 3 March 2003 (03.03.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
MI2002A000415 1 March 2002 (01.03.2002) IT(71) Applicant (for all designated States except US): CHEMI  
S.P.A. [IT/IT]; Via dei Lavoratori, 54, I-20092 Cinisello  
Balsamo (IT).

(72) Inventors; and

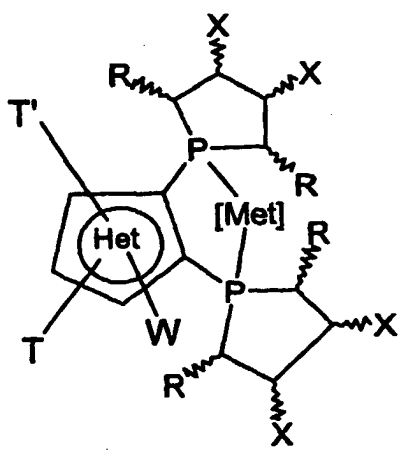
(75) Inventors/Applicants (for US only): SANNICOLO,  
Francesco [IT/IT]; Via Pacini, 39, I-20134 Milano (IT).  
PICCOLO, Oreste [IT/IT]; Via Bornò, 5, I-23896 Sirtori  
(IT). BENINCORI, Tiziana [IT/IT]; Via Pacini, 39,  
I-20131 Milano (IT). SADA, Mara [IT/IT]; Via Diaz,  
29, I-20017 Rho (IT). VERRAZZANI, Alessandra  
[IT/IT]; Via C. Morandi, 35, I-56124 Pisa (IT). TOLLIS,  
Simona [IT/IT]; Via E. Zincone, 35, I-03039 Sora (IT).  
ULLUCCI, Elio [IT/IT]; Via Fiuggi, 47, I-04100 Latina  
(IT). DE FERRA, Lorenzo [IT/IT]; Viale delle Province,  
6, I-00162 Roma (IT). RIZZO, Simona [IT/IT]; Via  
Gogol, 6, I-San Giuliano Milanese (IT).(81) Designated States (national): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE,  
SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,  
VC, VN, YU, ZA, ZM, ZW.(84) Designated States (regional): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

## Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv)) for US only

## Published:

— with international search report

(88) Date of publication of the international search report:  
25 March 2004For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.(54) Title: METALORGANIC CATALYSTS FOR CHEMO-, REGIO- AND STEREoselective REACTIONS, AND CORRE-  
SPONDING PRECURSORS(57) Abstract: Metallic catalysts of the general formula (I) and their precur-  
sors, suitable for chemo- regio- and stereoselective reactions, derived from or-  
tho- bis(1-phospholanyl)-heteroarenes. The new catalysts are characterized by  
the presence of two homomorphic phospholanic rings set in adjacent positions  
of an aromatic pentatomic heterocycle.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 03/02160

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B01J31/24 C07F9/6568 C07D333/26 C07D333/62 C07D209/04  
C07D207/46 C07F3/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B01J C07F C07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, CHEM ABS Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 03 031456 A (SOLVIAS AG ;BERENS ULRICH (DE)) 17 April 2003 (2003-04-17)  claims 9-13; examples 11-13,18,19	1-4, 11-14, 16,20-24
A	WO 99 24444 A (BERENS ULRICH ;CHIROTECH TECHNOLOGY LTD (GB)) 20 May 1999 (1999-05-20) cited in the application claim 2	1-24
A	US 5 329 015 A (BURK MARK J) 12 July 1994 (1994-07-12) cited in the application column 5, line 18 - line 30 column 6, line 5 - line 7	1-24
	--- -/-- ---	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*G\* document member of the same patent family

Date of the actual completion of the international search

25 September 2003

Date of mailing of the international search report

10/10/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Klaes, D

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 03/02160

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>FERNANDEZ, ELENA ET AL: "Rationally designed improvement of the bis(phospholano)ethane ligand for asymmetric hydrogenation leads to a reappraisal of the factors governing the enantioselectivity of Duphos catalysts" CHEMICAL COMMUNICATIONS (CAMBRIDGE) (2000), (17), 1663-1664 , XP002255677 figure 4; table 1</p> <p>-----</p>	1-24

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/02160

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 03031456	A	17-04-2003	WO 03031456 A2	17-04-2003
WO 9924444	A	20-05-1999	AT 206128 T	15-10-2001
			AU 1041099 A	31-05-1999
			CA 2307192 A1	20-05-1999
			DE 69801841 D1	31-10-2001
			DE 69801841 T2	16-05-2002
			EP 1028967 A1	23-08-2000
			ES 2162473 T3	16-12-2001
			WO 9924444 A1	20-05-1999
			JP 2001522855 T	20-11-2001
			US 6545183 B1	08-04-2003
US 5329015	A	12-07-1994	US 5171892 A	15-12-1992
			US 5386061 A	31-01-1995
			US 5565593 A	15-10-1996
			US 5559267 A	24-09-1996
			US 5596114 A	21-01-1997
			US 5532395 A	02-07-1996
			AT 153667 T	15-06-1997
			DE 69220061 D1	03-07-1997
			DE 69220061 T2	11-09-1997
			EP 0592552 A1	20-04-1994
			ES 2103953 T3	01-10-1997
			HK 1001060 A1	22-05-1998
			JP 6508848 T	06-10-1994
			WO 9301199 A1	21-01-1993